An Evaluation Toolkit for the
Eco-Schools USA
Climate Change Connections (CCC) Program
Educator Participant Version

Prepared for
National Wildlife Federation
NASA

Prepared by
Program Evaluation and Educational Research (PEER) Associates

July, 2011

Table of Contents

Introduction

Evaluation Requirements for Teachers to Administer to Eco-Schools USA CCC to students:

1. **Pre- and Post-Student Surveys**
2. **First Word and Last Word for "climate change"**
3. **Reflection Tools for Each Module or Lesson**

Over the course of the year, teachers can build in many opportunities to assess how students are learning, providing feedback to both teachers and students. This evaluation toolkit offers a set of tools for assessing student learning, including: a schedule for completing all CCC evaluation activities, the survey that you will administer to students at the beginning and end of the CCC program; First Word/Last Word instructions and assessment tool, and reflection tools for the modules and lessons. These tools are an important component of our evaluation that help us to determine the effectiveness of the CCC program, and as well provide you information along the way about how and what students are learning.

Surveys
You are responsible for administering the survey to your students prior to implementing the curriculum, and then after you have completed your CCC unit ***to the same group of students*** (if at all possible). At the same time that you administer surveys to your CCC students, please choose a comparison group of students (same grade level) who did not participate in CCC and administer pre- and post-surveys ***to the same group of students both times***.

First Word/Last Word
Please have students complete a First Word with "**climate change**." Then, have students complete a Last Word with "**climate change**" (and do reflection activity) at some point after they have finished the unit. Please deliver these to your CCC staff.

Reflection Tools
Please choose at least one reflection tool to administer to students at the end of each module or lesson. You may choose either Head + Heart + Hands, Take a Stand, Justified True/False Statements, or Science Notebooks, and you can choose a different tool for each lesson or module. When completed, please deliver to your CCC staff, along with the table on the back of each tool.

The reflection part of the toolkit provides simple instruction on tasks that ask students to actively demonstrate what they know about a given topic. Along with the tasks, the toolkit offers a simple way of scoring student reflection that will allow teachers to assess student learning, as well as provide evaluation information on the program level. These tools are closely aligned with the idea of promoting student reflection. The process of sifting through learning experiences allows students to become aware of what they have learned, and to make connections other parts of their lives.

CCC Task Calendar

Place an X in the box for the month that you actually complete each task.
Each person is responsible for handing in their task calendar to CCC staff at the end of the program.

Your School_____ Your Name_____

Evaluation Task List	June, 2011	July, 2011	Aug, 2011	Sept, 2011	Oct, 2011	Nov, 2011	Dec, 2011	Jan, 2012	Feb, 2012	Mar, 2012	Apr, 2012	May, 2012	June, 2012
a) CCC Educator pre-survey/application	X												
b) Educator PD survey (post-institute)													
c) Regional staff and educator check-in													
d) Student pre-survey – NASA*													
e) Student pre-survey – Eco-Schools													
f) First Word for "climate change" with students (do only once: at the beginning of your unit, fall or winter)													
g) Last Word "climate change" with students (do only once: IF First Word in fall, Last Word in Dec/Jan; IF First Word in Winter, Last Word May/June)													
h) Reflection tool for end of each module or lesson*													
i) Progress and review webinars													
j) Student post-survey – NASA*													
k) Student post-survey – Eco-Schools													
l) Educator – end of event survey – NASA*													
m) Educator – post-survey – Eco-Schools USA, link will be sent by your regional staff contact													
n) Educator – end of experience survey – NASA*													

Special Notes:

d) Student pre-survey – from NASA https://oedc.nasa.gov/dc/anonymous.jsp?a=532430799993916045324129121 84
The survey will only be given one time and only one X will be placed in this row. Depending on your time frame for implementation will determine which month you mark your X.

e) and **k)** Student pre- and post-surveys – Eco-Schools. Each survey will only be given one time and only one X will be placed in the row. Your time frame for implementation will determine which month you mark your X.

h) There are several reflection tools available to you in your teacher toolkit. Please select one to complete at the conclusion of each lesson or module. The reflection tool could also be used as a grade instead of an additive assessment. CHOICES: Head +Heart + Hands, Science Notebook, Take a Stand, and Justified T/F statements.

j) Student post-survey – NASA
https://oedc.nasa.gov/dc/anonymous.jsp?a=532430799997616075324129121 84
The survey will only be given one time and only one X will be placed in this row. Depending on when your implementation plan is complete will determine which month you mark your X.

n) Educator – End of Experience Survey – NASA
https://oedc.nasa.gov/dc/anonymous.jsp?a=532430799995216055324129121 84
You will take this survey at the same time your students take the ***Student Post-Survey – NASA***.

Directions for educators administering CCC surveys to students

Thank you for helping us to better understand the workings and impacts of the CCC program. The students' input is very important. Consistent administration of these surveys will assure that the information they provide is usable in our research. If different sites approach the survey in different ways, we will have results that are not comparable.

Please administer survey to CCC students prior to implementing the curriculum, and then after you have completed your CCC unit ***to the same group of students*** (if at all possible). At the same time that you administer surveys to your CCC students, please choose a comparison group of students (same grade level) who did not participate in CCC and administer pre- and post-surveys ***to the same group of students both times***.

Please follow these steps when administering the surveys to your students.

1. Please administer the survey during school time (rather than sending it home).
2. Please assure that students are not talking to one another or sharing answers.
3. For some students, it may be necessary to read each question aloud as they choose an answer. If so, please use the questions as they are on the sheet without providing examples. Simple clarifications of terms may be necessary.
4. Please allow a maximum of 15 minutes for completion of the survey. (It is unlikely to take that long, however.)
5. You have a couple of options for administering the survey. If you have access to several computers simultaneously, please have your students fill out the surveys directly on line at http://www.SurveyMonkey.com/s/CCCStudentSurvey. As a second best alternative, print out paper copies from this toolkit (NOT from the online version), administer survey and send results to your regional NWF contact. They will input the data for you.
6. Once you have completed administering the survey, contact CCC's program evaluator, Rachel Becker-Klein, at Rachel@PEERassociates.net to inform her of your progress, and she will provide you with direct access to the results.

Please read the following statements out loud to your students:

1. This is not a test. There is no right or wrong answers. You do not need to write your name on the survey if you do not want to, but it is important to write down your school name.
2. Please do not leave any answers blank. Choose the answer that best matches how you feel.
3. Your ideas are important. Thank you for participating.

If you have any questions, concerns or feedback about this please feel free to call or email CCC's program evaluator, Rachel Becker-Klein, Rachel@PEERassociates.net.

Eco-Schools USA
Climate Change Connections
Student Survey

By taking this survey, you are helping us understand what students think about climate change, technology, science, and the environment. Please try to answer these questions as honestly and accurately as possible. This is not a test and you won't get a grade on it. **Thank you!**

Today's Date _____ Your Name _____

Grade Level_____ School Name_____

1. What kind of work do you expect to be doing when you are 30 years old?

How much do you know about…? *Please circle the number that shows what you know for each statement.*	*Not much!*	*A little*	*Quite a bit*	*A lot!*	*Not sure*
2. Climate change ***science*** (carbon cycle, greenhouse gases, carbon footprint, etc.).	1	2	3	4	0
3. Climate change ***impacts*** (rising sea levels, habitat changes, increased severe weather events, etc.).	1	2	3	4	0
4. Climate change ***solutions*** (reducing energy use, etc.).	1	2	3	4	0
5. Climate change ***actions*** (carbon/energy assessments).	1	2	3	4	0

How much of this do you do in school… *Please circle the number that shows how often you do this in school for each statement.*	*Not much!*	*A little*	*Quite a bit*	*A lot!*	*Not sure*
6. Collect data for a project.	1	2	3	4	0
7. Plan and conduct experiments.	1	2	3	4	0
8. Gather data from relevant sources.	1	2	3	4	0
9. Work in a science notebook.	1	2	3	4	0

How much does your school do this… Please circle the number that shows what you know for each statement.	Not much!	A little	Quite a bit	A lot!	Not sure
10. Have a "Green" or environmental team	1	2	3	4	0
11. Try to save energy	1	2	3	4	0
12. Try to save water	1	2	3	4	0
13. Create and use outdoor classrooms	1	2	3	4	0
14. Encourage biking or walking to school	1	2	3	4	0
15. Recycle and/or reduce waste	1	2	3	4	0

Please circle the number that shows what you think or feel about each statement.	*No Way!*	*Probably Not*	*Maybe*	*Definitely*	*Not sure*
16. Learning about science/NASA data /technology is interesting.	1	2	3	4	0
17. Learning about science/NASA data/technology has opened my eyes to new and exciting jobs.	1	2	3	4	0
18. The things I have learned about science/ NASA data/technology will be helpful in my everyday life.	1	2	3	4	0
19. I like learning how to use new technologies (such as Google Earth).	1	2	3	4	0
20. I feel that it is my responsibility to help solve climate change issues in my community.	1	2	3	4	0
21. I would be willing to change my personal habits if it helped prevent climate change.	1	2	3	4	0
22. I believe that what I do every day can have an impact on climate change.	1	2	3	4	0
23. I want to help prevent climate change.	1	2	3	4	0

The end. Thank you for completing this and giving your best effort!

First Word/ Last Word[1]

Time requirements: 10-15 minutes each time **Before and After each module/lesson**
Materials required: Pen and paper

First Word/Last Word is an acrostic that is used to represent student's understanding of a concept. By having students complete this activity before they learn a concept, you can determine what they know about a subject. By having them do the ***acrostic for the same words*** after they learn the concept, you will gain a window into what they learned. Allowing the students to compare and contrast their acrostics gives them the opportunity to reflect on their learning.

1. **Explain** to students what acrostics are: write a word vertically down a page, and then compose a sentence for each letter of that word (see examples of First Word and Last Word on Page 33).
2. Have the students write their own acrostics for the concept you will be learning (a **First Word**). For CCC, you will use "Climate Change." If you have ideas about another word to use that would be more relevant or useful for CCC evaluation data, please don't hesitate to contact CCC program staff or evaluators.
3. **Assess** students' First Words to identify their base knowledge and any misconceptions about the subject matter. Use the assessment of these maps to adapt your curriculum.
4. **File** the First Words in a place that you will be able to easily retrieve them after you have taught the unit or project or concept.
5. After you have taught the unit or project or concept, allow students time to write another acrostic ***for the same topic***, repeating the activity described in step 2 above (**Last Word**).
6. When both acrostics are completed, provide time for the students to look at both of them and reflect on their learning about the concept, allowing them to see their own change and progress. **Reflection** can be done individually or in pairs or small groups, and either aloud or written. Monitor their reflection.
7. **Please use the First Word/Last Word scoring tool on the back of this page to assess each of your students' learning.**
8. Finally, compile all of the scores into one Table 1 (see the bottom of the scoring tool page) and deliver to CCC staff.

[1] Adapted from Keeley, P. (2008). *Science Formative Assessment: 75 Practical strategies for linking assessment, instruction, and learning.* Thousand Oaks, CA: Corwin Press.

EXAMPLE

First Word – Photosynthesis

Plants make their own food
Happens in cells
Other animals eat plants
The roots take up food and water
Oxygen is breathed in through leaves
Sunlight makes food for plants
You can't make your own food
Needs water, sunlight, oxygen and minerals
The leaves, roots, and stems are all parts that make food
Have to have sun and water
Energy comes from the sun
Sunlight turns plants green
It happens in all plants
Soil is used by plants to make food

Last Word – Photosynthesis

Producers such as plants use energy from the sun to make their food
Happens in the cells that have structures called chloroplasts
Other organisms that eat plants are using stored energy from the plant
The roots take water up to the leaves where it reacts with sun and CO2
Oxygen is given off during photosynthesis and is used by plants and animals
Sunlight provides the energy so plants can make food
You need to have cells with chloroplasts and chlorophyll to make food
Need water, carbon dioxide, and sunlight to make food
The leaf is the food making part
Have to have sunlight, water, and carbon dioxide
Energy comes from sunlight
Sunlight is trapped in the chlorophyll
Is a necessary life process for all plants
Soil holds the water for plants and gives some minerals

First Word/Last Word Scoring Tool

School name: _____ **Teacher name:** _____

Acrostic topic: _____ **First word date:** _____ **Last word date:** _____

For each student, how much do you agree with the statements in each column?

1 = Strongly Disagree
2 = Disagree
3 = Tend to Disagree
4 = Tend to Agree
5 = Agree
6 = Strongly Agree
0 = Data Missing or Unsure

Student Name	FIRST Word Represents Deep Understanding of Topic	LAST Word Represents Deep Understanding of Topic	Reflection on First and Last Word Deepened Student Learning
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

Table 1. Summary of First Word/Last Word:

Variable	Average for the class
First Word represents deep understanding of concept	
Last Word represents deep understanding of concept	
Reflection allowed students to deepen learning of concept	

First Word – Climate Change

C
L
I
M
A
T
E

C
H
A
N
G
E

Last Word – Climate Change

C
L
I
M
A
T
E

C
H
A
N
G
E

Head + Heart + Hands[2]

Time requirements: 15 minutes
Materials required: Written: pen and paper;

After completion of module or lesson
Discussion: Chart paper and pens

Head: Cognitive connections; overt reference to topic, term, skill
Heart: Affect; attitudes, emotions, feelings
Hands: Behavior; past, current, or future behaviors

Head – What have you learned about [service-learning project topic]?
Heart – How do you feel about what you have learned? Why?
Hands – Describe what you might do as a result of what you have learned. How might you change your behavior in the future now that you have learned about this topic?

Step 1. Head + Heart + Hands activity
Have **students answer each of the 3 questions** above. This can be done by having students write down their thoughts individually, or as a group discussion, with every individual student participating. [*NOTE: If done as a group discussion, please write down everyone's input, identified by name, on chart paper so you will be able to refer back to it later.]*

Step 2. Scoring
Please **use the scoring tool** on the back of this page to assess each of your students' Head + Heart + Hands reflections.

Finally, **compile** all of the assessments into one Table 1 (on the back side of this page) and deliver to your CCC staff.

Consider:
- No right or wrong answer when expressing feelings.
- Students do need to articulate WHAT they are feeling and WHY.

[2] Based on tool developed by Marshall Welch (1999).

Head + Heart + Hands Scoring Tool

School Name: _____ **Teacher Name:** _____

Learning activity topic: _____

Format: ☐ **Written** ☐ **Discussion**

Assign 3 points each for Head, Heart, and Hands, based on the following:

- Level 0 (0 pts.) = no discussion
- Level 1 (1 pt.) = cursory discussion without elaboration of "why" or "how"
- Level 2 (2 pts.) = deeper observation, but still limited in context or application
- Level 3 (3 pts.) = complex application, understanding, and articulation

Student Name	Head	Heart	Hands	Total H's	Deepened Learning*
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					
19.					
20.					

* How much do you agree with the following statement? **Head + Heart + Hands allowed this student to deepen his/her learning.** 1 = Strongly DISAGREE; 2 = Tend to DISAGREE; 3 = Tend to AGREE; 4 = Strongly AGREE; 0 = Not Sure or N/A

Table 1. Summary of Head + Heart + Hands:

Variable	Average for the class
Head	
Heart	
Hands	
Total of H's	
Head + Heart + Hands allowed students to deepen learning	

Take a Stand[3]

Grade levels: All grades
Time requirements: 15 minutes **After completion of lesson or module**
Materials required: None

Take a Stand is a form of reflection that involves asking students to literally stand up for their position. The main purpose of this activity is to promote dialogue and discussion around an issue of interest.

Step 1. Present students with a statement that is related to the concept you are teaching.
If students agree with the statement, they are asked to stand up. If they do not agree, they continue sitting in their seats.

Variation: Instead of a dichotomous Yes/No position, students arrange themselves in the room in order of their beliefs from Strongly Disagree to Strongly Agree.

Step 2. Students explain their position.
Choose one of the students standing up (or to one end of the line in the variation) to explain his/her position. Then choose one of the students sitting down (or on the other end of the line in the variation) to explain his/her position.

Step 3. Discourse ensues.
Allow other students to add to the discourse as they see fit. Participating in and listening to the discourse provides an immediate and effective assessment of participants' understanding of the topic.

Step 4. Students indicate agreement with statement.
After the discussion is over, ask students to physically show how much they agree with the statement (some students will have changed their opinion, and this is fine). Have one end of the room indicate "strongly agree," and the opposite end indicate "strongly disagree," and ask students to stand anywhere on the continuum where they would place themselves. You may ask each individual student to explain why they are standing where they are.

Step 5. Assessment
Please use the assessment rubric on the back of this page to assess each of your students' Take a Stand activities.

Finally, compile all of the assessments into one Table 1 (on the back side of this page) and deliver to your CCC staff.

[3] Adapted from Eyler, Giles, and Schmiede (1996), and Welch, M. (1999)

Take a Stand Assessment Rubric

School name: _____ **Teacher name:** _____

Grade: _____ **Statement:** _____

Assign 3 points each for the Take a Stand activity, based on the following:

- Level 0 (0 pts.) = did not participate
- Level 1 (1 pt.) = cursory participation with marginal/limited understanding
- Level 2 (2 pts.) = deeper participation, but still limited understanding
- Level 3 (3 pts.) = complex participation, understanding, and articulation

Student Name	Participated in group discussion	Explained position in room	Rating*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

* How much do you agree with the following statement? **Take a Stand allowed this student to deepen his/her learning.** 1 = Strongly DISAGREE; 2 = Tend to DISAGREE; 3 = Tend to AGREE; 4 = Strongly AGREE; 0 = Not Sure or N/A

Table 1. Summary of Take a Stand:

Variable	Average for the class
Participated in group discussion	
Explained position in room	
Take a Stand allowed students to deepen learning	

Justified True or False Statements[4]

Time requirements: 15 minutes **After completion of module or lesson**
Materials required: Written: pen and paper

Justified True or False Statements provide a set of claims or statements that are examined by students. Students are meant to draw on evidence from what they have learned to analyze the validity of the statements, and then describe the reasoning they used to decide whether each claim is true or false.

Step 1. Have students answer T or F to each statement and explain reasoning.
Choose a set of three to six statements (depending on the developmental level of your students) that are central to the topic of the curriculum. Avoid simple recall statements of factual information. Statements should provoke student thinking, drawing out commonly held ideas that students might have that are related to the topic.

Ask students to choose True or False for each statement, and explain their rationale. This activity can be done individually or in small groups.

For example, see the table below:

Statement	T	F	Why I (We) Think So
1. Mountains are made mostly of rock.			
2. As mountains get older, they keep growing taller.			
3. Beach sand comes from rocks under the ocean.			

Step 2. Small group discussion
Convene small groups of students to discuss their ideas and try to come to some consensus. As the small groups discuss, circulate and listen to ideas.

Have each group share with the whole class the idea they came up with, and then have the class vote on the answer, followed by whole class discussion of rationale for that choice.

Step 3. Scoring
Please use the scoring tool on the back of this paper to assess each of your students' activities. Finally, compile Table 1 (also on the back of this page) and deliver to your CCC staff.

[4] Taken from Keeley, P. (2008). *Science Formative Assessment: 75 Practical strategies for linking assessment, instruction, and learning.* Thousand Oaks, CA: Corwin Press.

Justified True or False Statements Scoring Tool

School name: _____ **Teacher name:** _____

Class: _____ **Learning topic:** _____

Assign 3 points for each part of the task, based on the following:

- Level 0 (0 pts.) = no explanation/participation
- Level 1 (1 pt.) = cursory explanation/participation without elaboration of "why" or "how"
- Level 2 (2 pts.) = deeper explanation/participation, but still limited in context or application
- Level 3 (3 pts.) = complex explanation/participation, understanding, and articulation

Student Name	Student explained choice	Student participated in small group discussion	Deepened learning*
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			

* How much do you agree with the following statement? **Justified True or False Statements allowed this student to deepen his/her learning.** 1 = Strongly DISAGREE; 2 = Tend to DISAGREE; 3 = Tend to AGREE; 4 = Strongly AGREE; 0 = Not Sure or N/A

Table 1. Summary of Justified True or False Statements

Variable	Average for the class
Student explained choice	
Student participated in small group discussion	
Justified True or False Statements allowed students to deepen learning	

Science Notebooks

Student science notebooks are meant to be a record of student learning and tool for students to redefine their thinking, ask questions and make claims without penalty, and by having a collection of their work students will build up prior learning and begin to demonstrate growth in their scientific understanding as the year progresses. Scientist never "get it" the first time, which is evident when looking at the notebooks of some of our greatest creators, such as Thomas Edison, Albert Einstein, and Marie Curie. Allow students to make changes to improve their grade; it will also improve their learning.

Rubric range: 3 points-12 points

Less than 3 points	**F**
3-6 points	**C**
7-9 points	**B**
10-12 points	**A**

Science Notebooking Resources

Araceliruizprimo, M. "On the Use of Students' Science Notebooks as an Assessment Tool." *Studies In Educational Evaluation* 30.1 (2004): 61-85.

Butler, Malcolm B., and Catherine Nesbit. "Using Science Notebooks to Improve Writing Skills and Conceptual Understanding." *Science Activities: Classroom Projects and Curriculum Ideas* 44.4 (2008): 137-46.

Campbell, Brian, and Lori Fulton. *Science Notebooks Writing about Inquiry*. Portsmouth, NH: Heinemann, 2003.

Douglas, Rowena. *Linking Science & Literacy in the K-8 Classroom*. Arlington, VA: NSTA, 2006.

Klentschy, Michael P. *Using Science Notebooks in Middle School*. Arlington, VA: NSTA, 2010.

Marcarelli, Kellie. *Teaching Science with Interactive Notebooks*. Thousand Oaks, CA: Corwin, 2010.

Waldmen, Cheryl, and Kent J. Crippen. "Integrating Interactive Notebooks." *The Science Teacher* 76.1 (January 2009): 51-55.

There are many examples on Slideshare (http://www.slideshare.net/arholder/interactive-science-notebooks) of how teachers at different grade levels instruct their students on how using science notebooks in the classroom.

Science Notebooks Scoring Tool

Student Name: _____ **Teacher/Class:** _____

Date: _____ **Assignment Topic:** _____

UNDERSTANDING SCIENCE CONCEPT	Self Assessment	Teacher Assessment	Notebooking Reasoning
+ 1-Limited			The information given is incomplete and or inaccurate.
+2-Developing			Work shows partial understanding, but also has significant inaccuracies or misconceptions.
+3-Acceptable			Work shows evidence of understanding the main ideas of the topic, though some information is missing or inaccurate.
+4-Accomplished			Work shows mastery of the topic's concept(s). Supporting work, such as graphs and diagrams support understanding and there is evidence of links between new and old learning.

SCIENTIFIC THINKING	Self Assessment	Teacher Assessment	Notebooking Reasoning
+ 1-Limited			Work lacks connections between evidence and conclusions. Ideas seem random and disconnected. Reporting is inaccurate.
+2-Developing			There are limited inferences, little if any questioning and few connections between evidence and conclusions. Reporting is limited and contains many inaccuracies.
+3-Acceptable			Inferences are reasonable, though they may be incomplete or have inconsistencies. Reporting is honest, shows awareness of scientific process skills.
+4-Accomplished			Inferences are strongly supported through evidence that process skills are well understood and used appropriately.

EXPOSITORY WRITING	Self Assessment	Teacher Assessment	Notebooking Reasoning
+ 1-Limited			Ideas are unclear, information is absent or irrelevant. Organization is random or absent. Key vocabulary no incorporated.
+2-Developing			Ideas are incomplete, details minimal, Organization is weak or inconsistent. Key vocabulary used minimally sometimes inaccurately.
+3-Acceptable			Ideas are clear and include many details. Organization is mostly logical and uses transition words. Many key vocabulary words included accurately.
+4-Accomplished			Ideas are fully developed with relevant evidence and details. Organization is sequenced logically, transitions words are present. Accurate use of key vocabulary. Voice is confident and may include self reflection and on target sentence structure is used to develop work

Adapted from Shelia Gaquin, How to Score Science Notebooks

Total Points Earned:
Point Grade Equivalent:
Comments: